Carbon Capture and Storage (CCS) in California

The Ratepayer Perspective

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Presentation Outline

- The CARB plan for achieving GHG reductions
- Costs of GHG reduction strategies
- CCS development/commercial viability
- Strategic opportunities for CCS

DRA's Mission

- The DRA is an independent division within the California Public Utilities Commission (CPUC).
- DRA mandated by Public Utilities Code §309.5 to advocate on behalf of public utility customers to obtain the lowest possible rate for utility service consistent with safe and reliable service levels.

ARB Plan For Achieving GHG Reductions

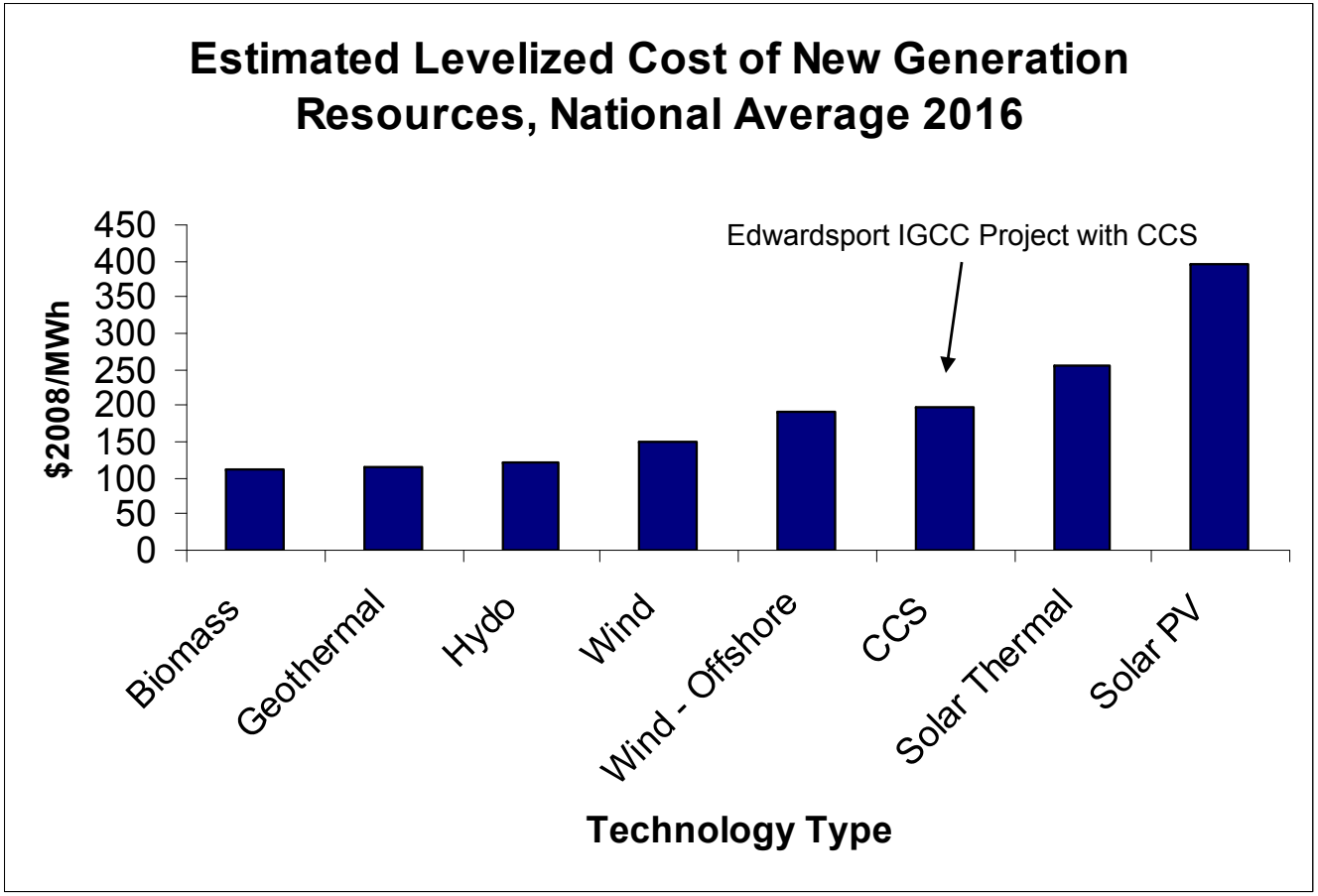
- Emission-reduction measures in AB 32 Scoping Plan

Reduction Measures	Reductions Counted Towards 2020 Target (MMT CO_2E)
Estimated Reductions from the Combination of Cap-and-Trade Program and Complementary Measures	146.7
Pavley Standards	31.7
Energy Efficiency	26.3
33% RPS	21.3
Low Carbon Fuel Standard	15.0
Regional Transportation Targets	5.0
Vehicle Efficiency	4.5
Goods Movement	3.7
Million Solar Roofs	2.1
Heavy/Medium Vehicles	1.4
High Speed Rail	1.0
Industrial Measures	0.3
Additional Reductions Necessary to Achieve Cap	34.4

- Required measures in addition to other "**cost-effective**" actions by capped sectors to achieve 2020 emissions target

- Will CCS be a cost-effective measure to achieve additional reductions?

Levelized Costs of Competing Technologies



Sources: Energy Information Administration, Annual Energy Outlook 2010
Utility Perspectives on CCS, Mark Nelson presentation June 2, 2010

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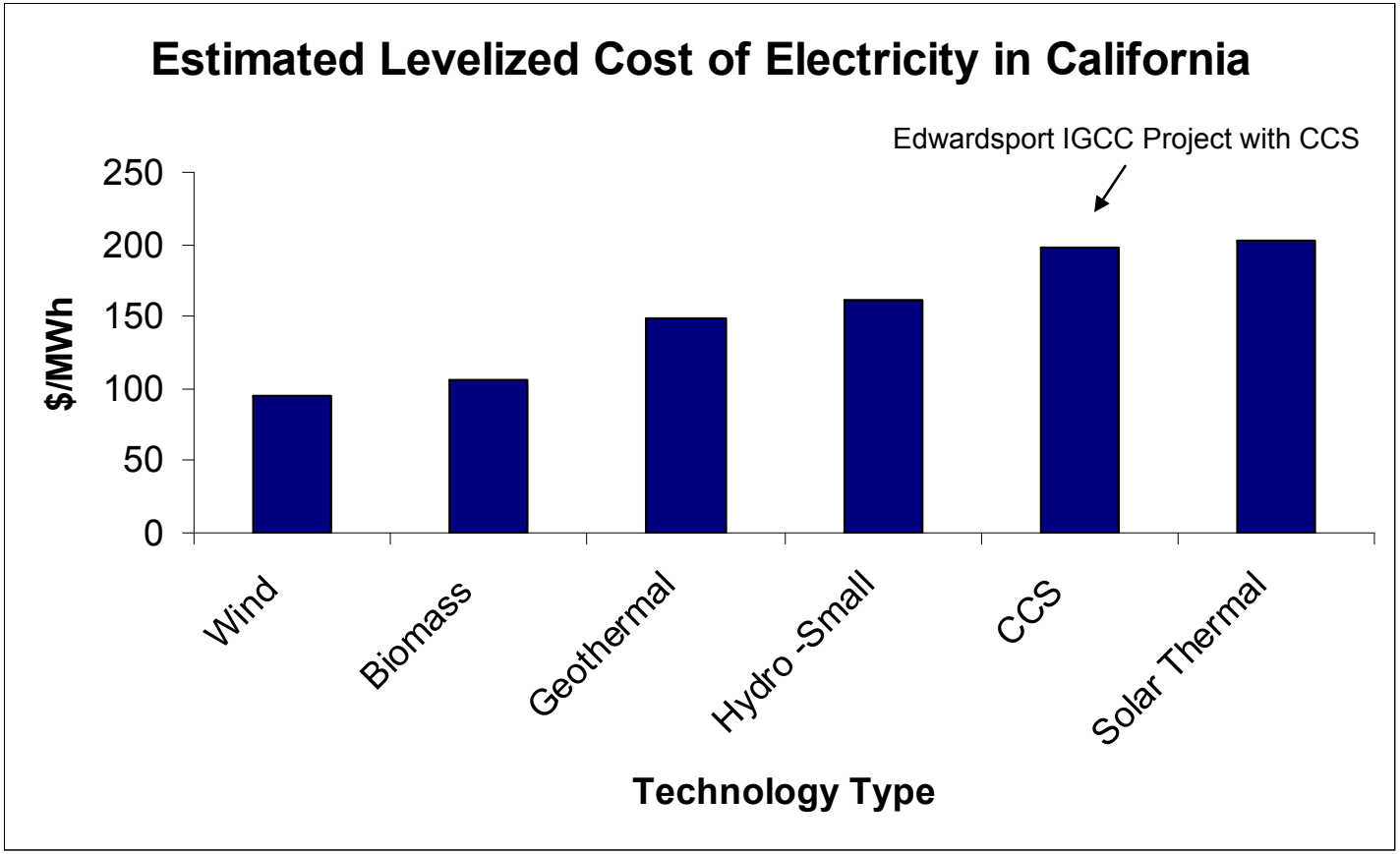

Sources: Energy Division, Long-Term Renewable Resource Planning Standards 2010
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Cost per Tonne of CO2 reduction for some technologies

• CSI	-$106 to $841
• Combined Heat and Power	-$161 to $389
• Biomass	$210
• Geothermal	$135
• Wind	$102
• Energy Efficiency	$-133 to $78
• Bio Gas	$50
• CCS	$??

Source: Energy and Environmental Economics, Inc. for Energy Division 2008

Cost of CCS is still developing

- Hydrogen Energy California HECA CCS project costs estimated at $2.3 Billion for a 390 MW IGCC facility
- Duke's Edwardsport IGCC estimated at $4.2 Billion with CCS for a 630 MW IGCC facility

Source: Energy Information Administration, Annual Energy Outlook 2010

CCS carries Technological Risk and Uncertainty

- Uncertainty in levelized costs over life of projects
- Uncertainty with long-term CO2 reduction impacts (e.g. leakage)
- Research and Development funding should be used to support CCS projects allowing CCS to compete with other developing GHG reduction strategies
- Ratepayer funding should be used for projects that provide demonstrated benefits with minimal risk

Strategic Plan with milestones can help

- Developing a Strategic plan that identifies specific milestones and that must be achieved in order to increase funding support will help policy makers determine when ratepayer funds should be used

- Level of shareholder funding an additional metric to assess the risk of financing a specific technology or project

Cap-and-Trade provides an opportunity for CCS emission reductions

- Cap-and-trade provides the regulatory framework to allow CCS to compete once it becomes cost-competitive
- An adequate framework is necessary to ensure that CCS projects are given appropriate credit
- DRA supports CCS as a strategy to compete with other emission-reducing strategies as part of the Cap-and-Trade program to achieve additional GHG reductions

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